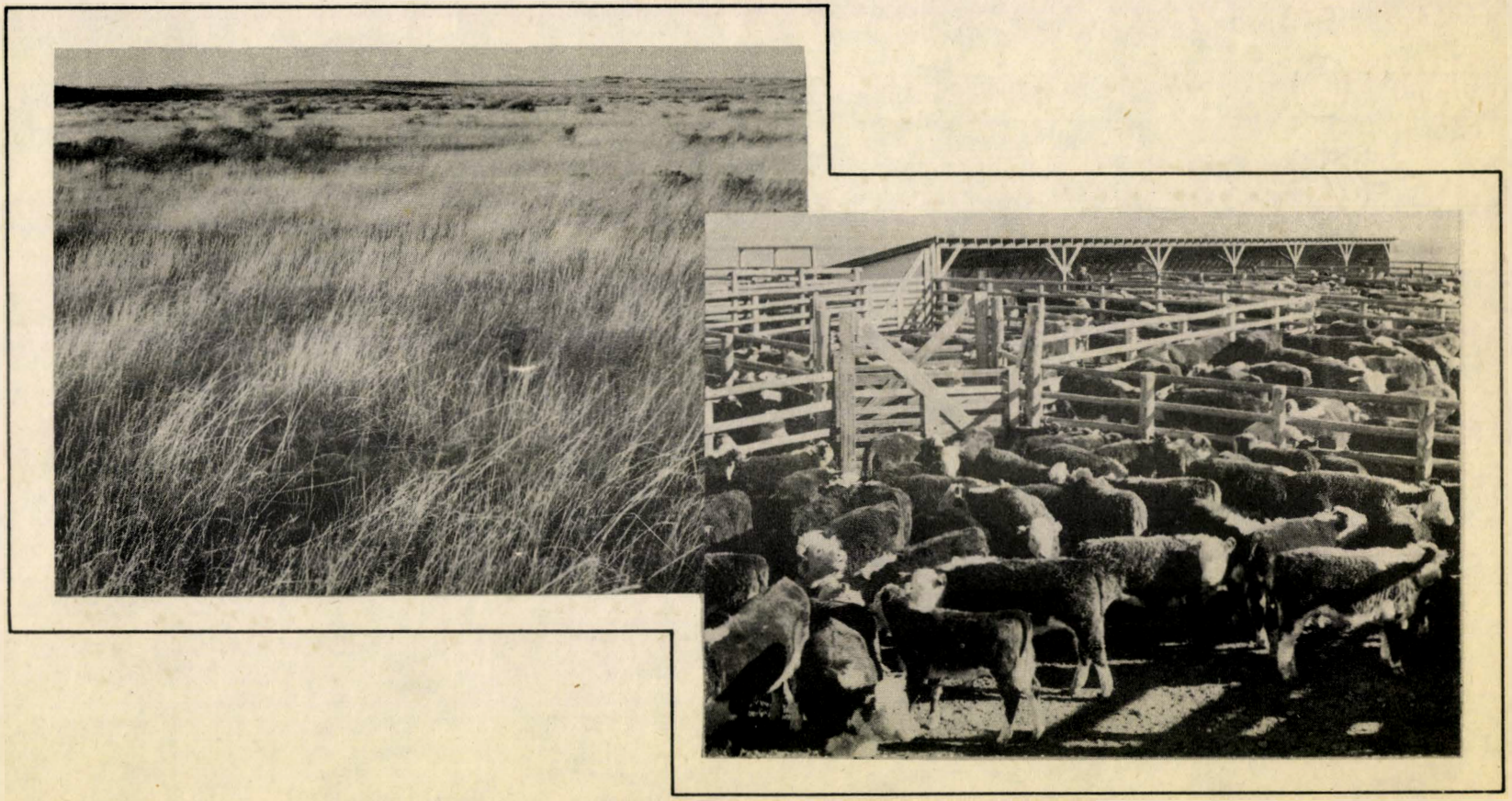
RANGE MANAGEMENT RESEARCH: PRELIMINARY RESULTS

W. M. Johnson

RANGE MANAGEMENT RESEARCH

PRELIMINARY RESULTS

BY W. M. JOHNSON



(NOT FOR PUBLICATION)

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION
U.S. DEPARTMENT OF AGRICULTURE — FOREST SERVICE
FORT COLLINS, COLORADO, MARCH — 1943

ROCKY MOUNTAIN FOREST AND RANGE EXPERIMENT STATION

RANGE MANAGEMENT RESEARCH

Preliminary Results

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The following charts present some preliminary results of range management studies on short-grass and ponderosa pine-bunchgrass ranges in Colorado.

The Central Plains Experimental Range, where studies on the short-grass range have been conducted, was established in eastern Colorado near the Wyoming boundary in 1937 and is typical of some 10 million acres of short-grass range. Intensive studies of range management factors on this area were started in 1940.

The Manitou Experimental Forest, where the other studies have been conducted, is located in the ponderosa pine zone of the Front Range of the central Colorado Rockies. Preliminary range management studies were started in 1940 and intensive studies began in 1942.

On the basis of the few years of study involved, certain data and trends have developed at both of these centers of study which are of economic importance to the livestock industry.

The studies on the Central Plains Experimental Range are in cooperation with the Soil Conservation Service and Colorado State College. The studies on the Manitou Experimental Forest are in cooperation with Colorado College at Colorado Springs.

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EXPERIMENT STATION

CENTRAL PLAINS EXPERIMENTAL RANGE

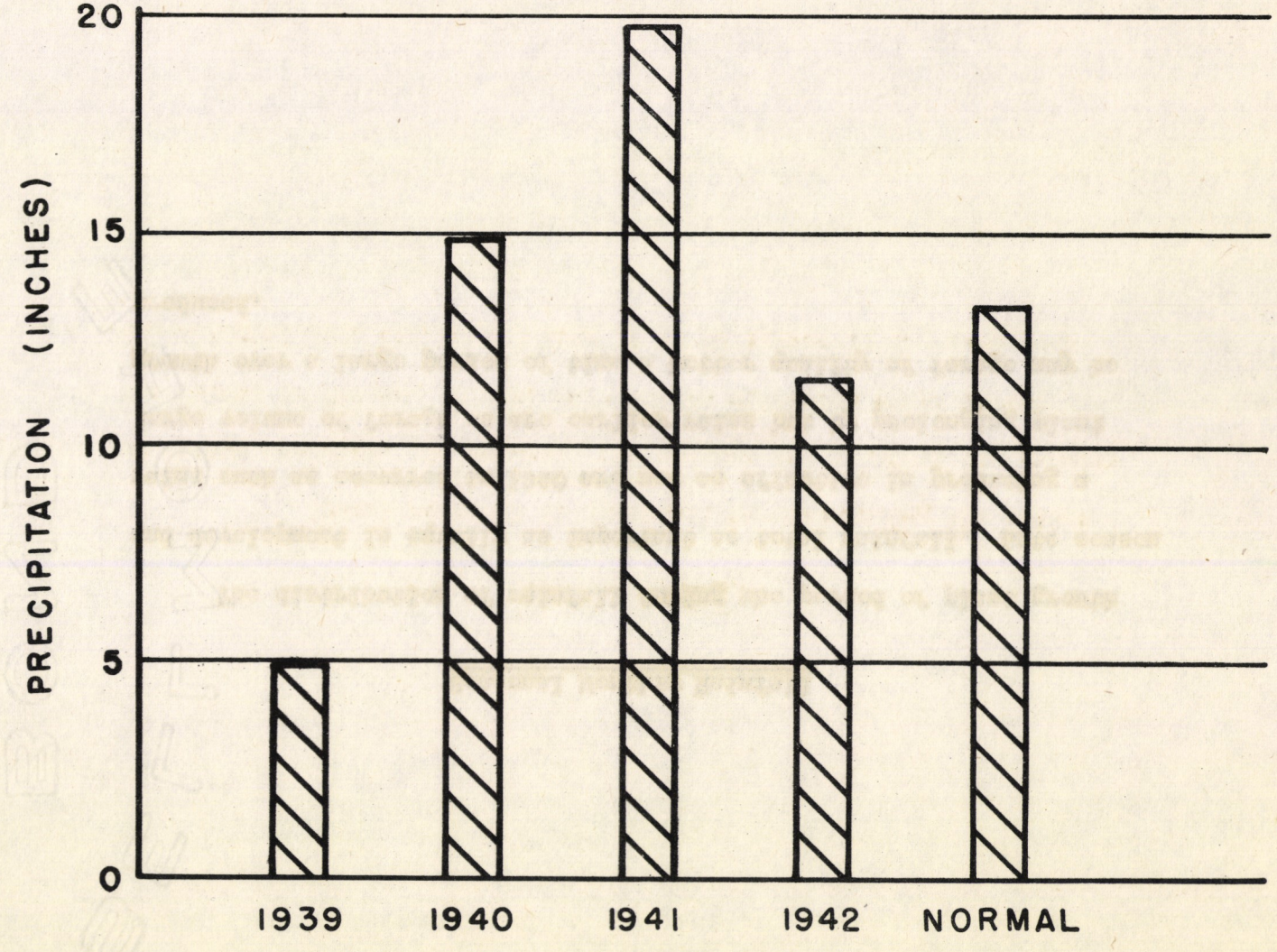
Short-grass Range

Annual Rainfall

Annual rainfall is important in determining the volume of forage produced. In general, the greater the rainfall the greater the volume of forage. Annual rainfall in different parts of the experimental area has varied from 11 to 15 inches in the same year.

ANNUAL PRECIPITATION

CENTRAL PLAINS EXP. RANGE



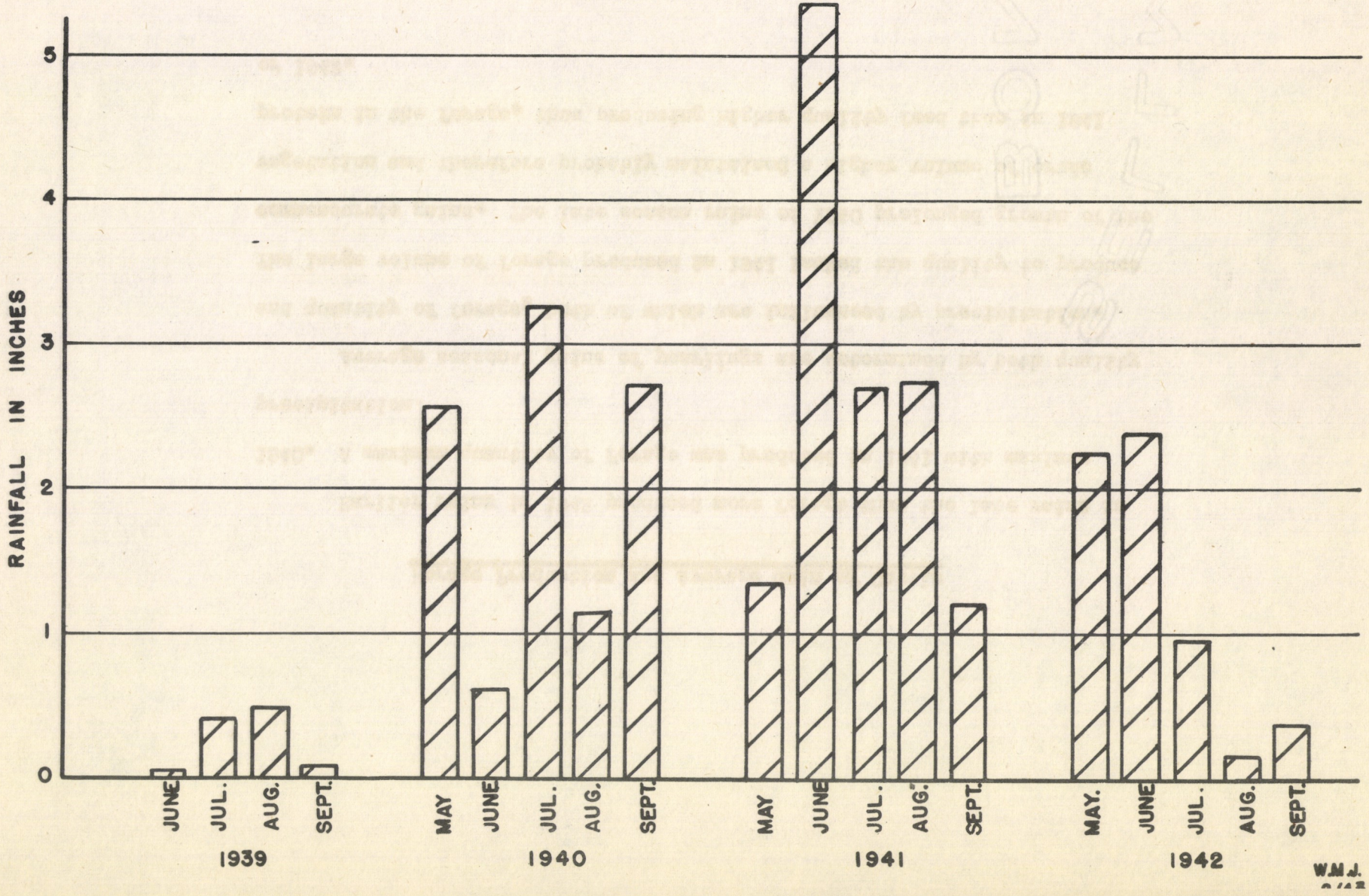
Seasonal Monthly Rainfall

The distribution of rainfall during the period of plant growth and development is equally as important as total rainfall. Late season rains such as occurred in 1940 are not as effective in producing a large volume of forage as are earlier rains but by prolonging plant growth over a large period of time a better quality of forage may be produced.

SEASONAL DISTRIBUTION OF RAINFALL

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT-GRASS RANGE



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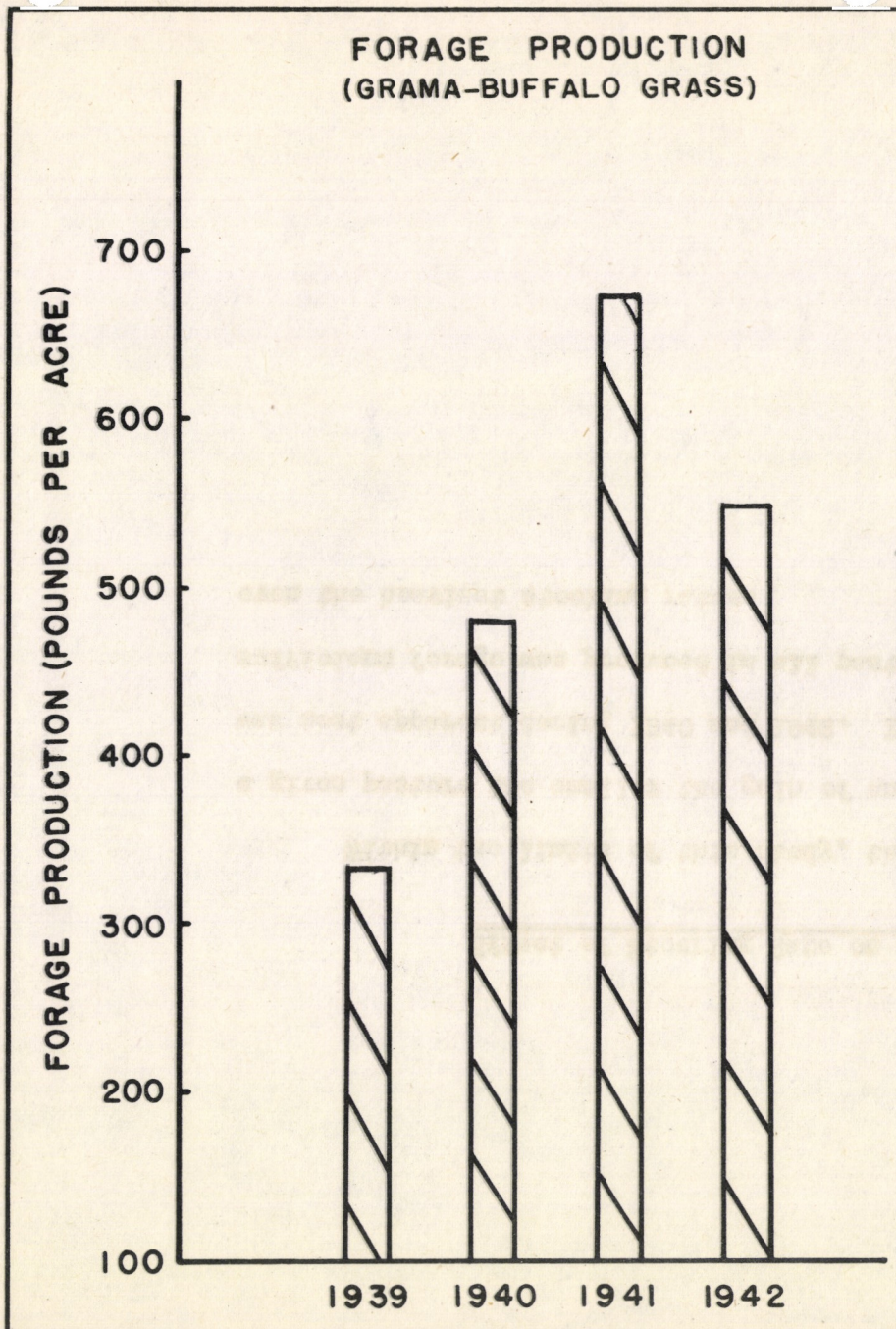
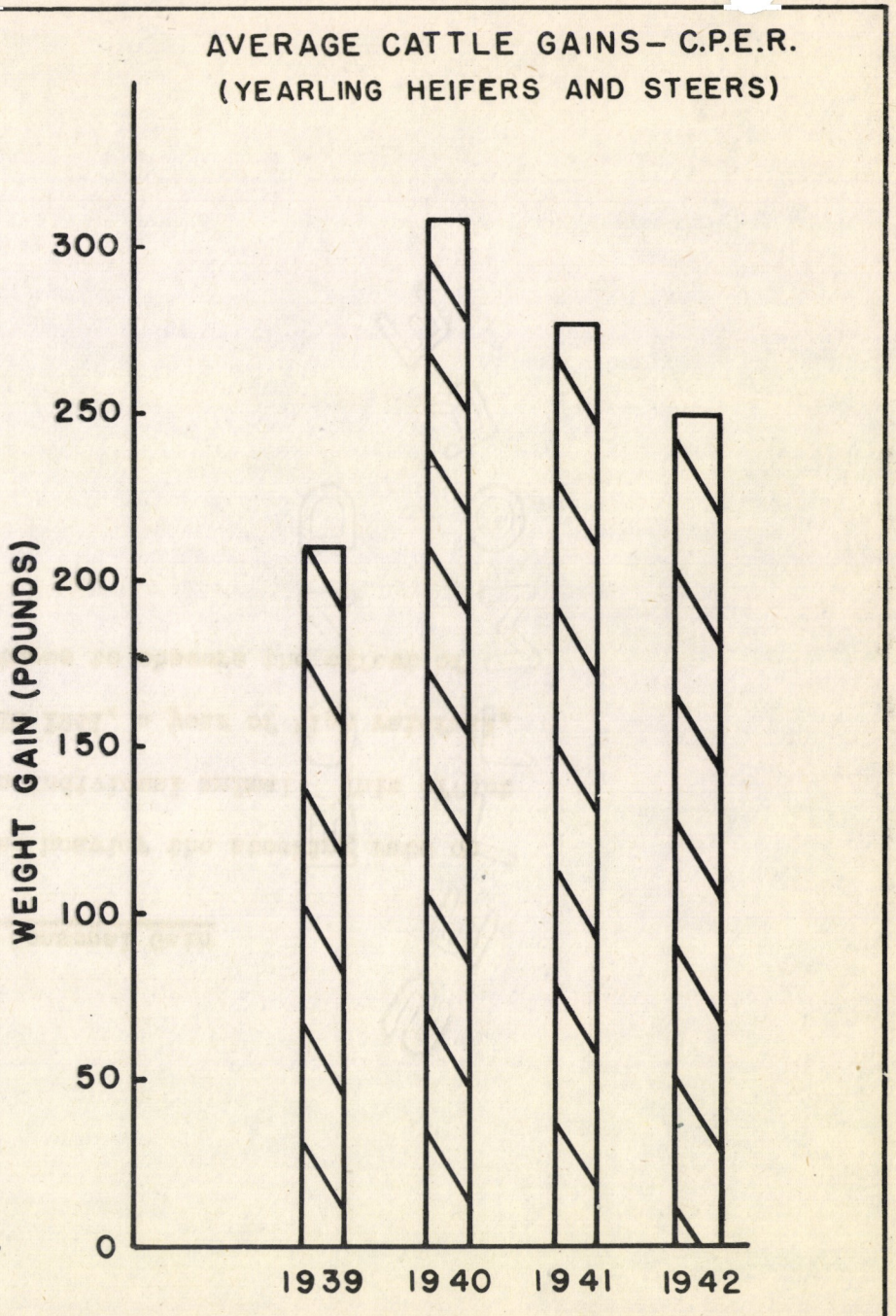
Forage Production and Average Gain of Cattle

Earlier rains in 1942 produced more forage than the late rains in 1940. A maximum quantity of forage was produced in 1941 with maximum precipitation.

Average seasonal gains of yearlings are determined by both quality and quantity of forage, both of which are influenced by precipitation. The large volume of forage produced in 1941 lacked the quality to produce commensurate gains. The late season rains of 1940 prolonged growth of the vegetation and therefore probably maintained a higher volume of crude protein in the forage, thus producing higher quality feed than in 1941 or 1942.


FORAGE PRODUCTION
(GRAMA-BUFFALO GRASS)
FORAGE PRODUCTION (POUNDS PER ACRE)
700
600
500
400
300
200
100
1939
1940
1941
1942


AVERAGE CATTLE GAINS- C.P.E.R.
(YEARLING HEIFERS AND STEERS)
WEIGHT GAIN (POUNDS)
300
250
200
150
100
50
0
1939
1940
1941
1942

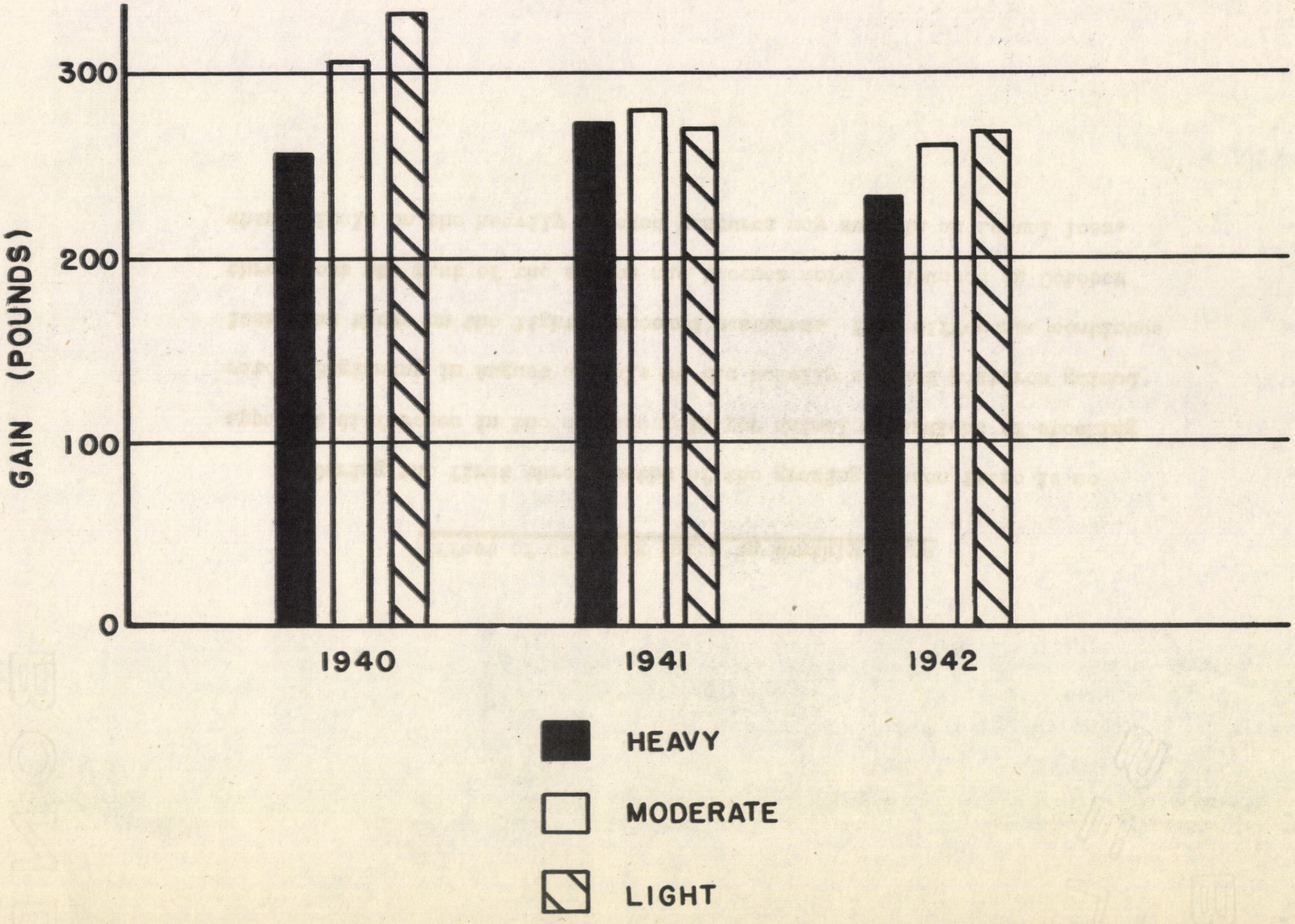
Effect of Stocking Rate on Seasonal Gain

Within the limits of this study, the heavier the stocking rate on a given pasture the smaller the gain of an individual animal. This effect was most apparent during 1940 and 1942. In 1941, a year of high rainfall, sufficient forage was produced in all pastures to obscure the effect of even the heaviest stocking rates.

AVERAGE GAIN PER ANIMAL BY GRAZING RATES

(MAY – OCTOBER)

C.P.E.R.



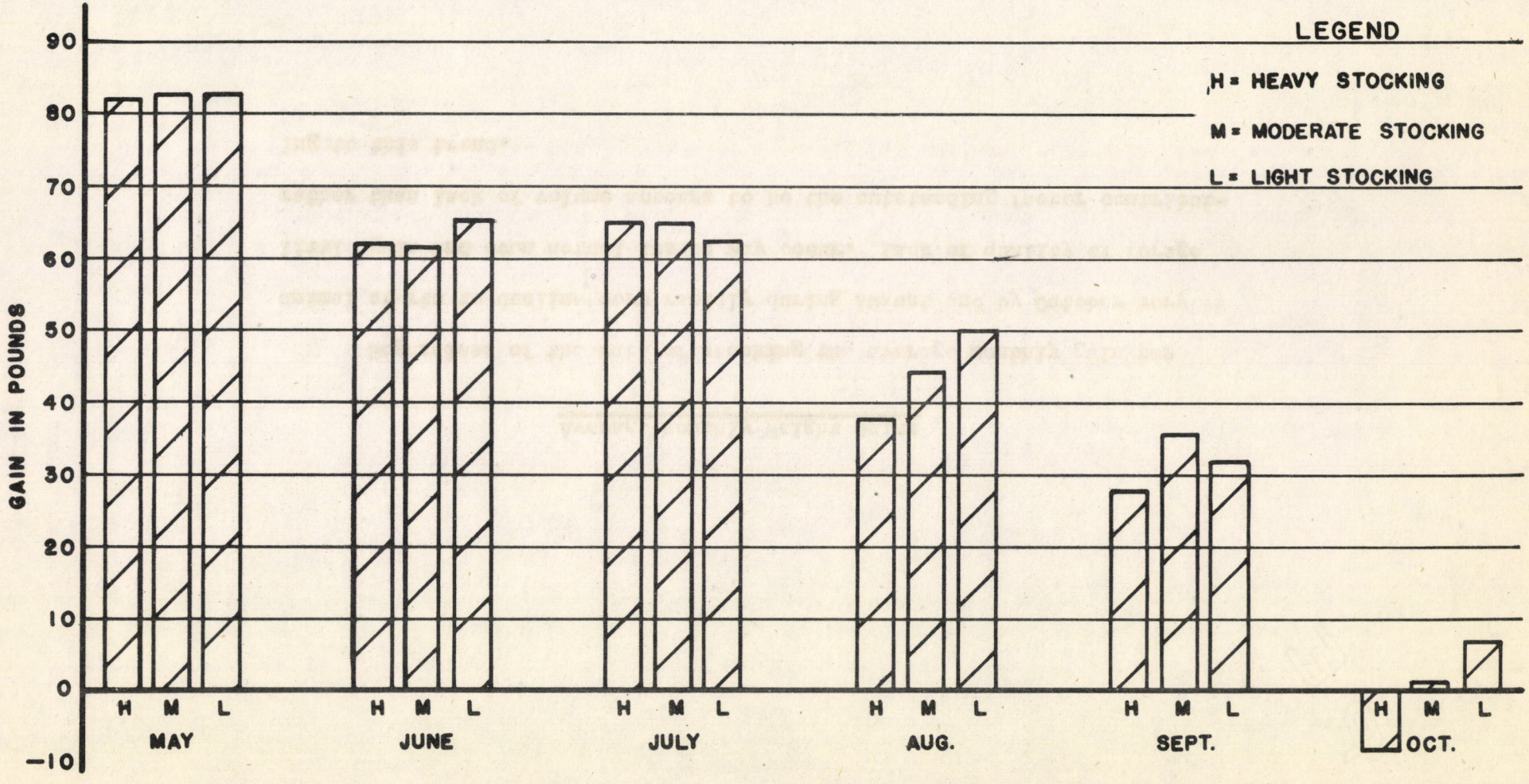
Effect of Stocking Rates on Monthly Gains

During the first three months of the grazing season there is no apparent difference in the average gain per animal regardless of stocking rate. Beginning in August animals on the heavily stocked pastures gained less than those on the lightly stocked pastures. This difference continues throughout the rest of the season and becomes more pronounced in October when animals on the heavily stocked pastures may sustain an actual loss.

AVERAGE MONTHLY WEIGHT GAINS OF YEARLING HEIFERS

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT-GRASS RANGE



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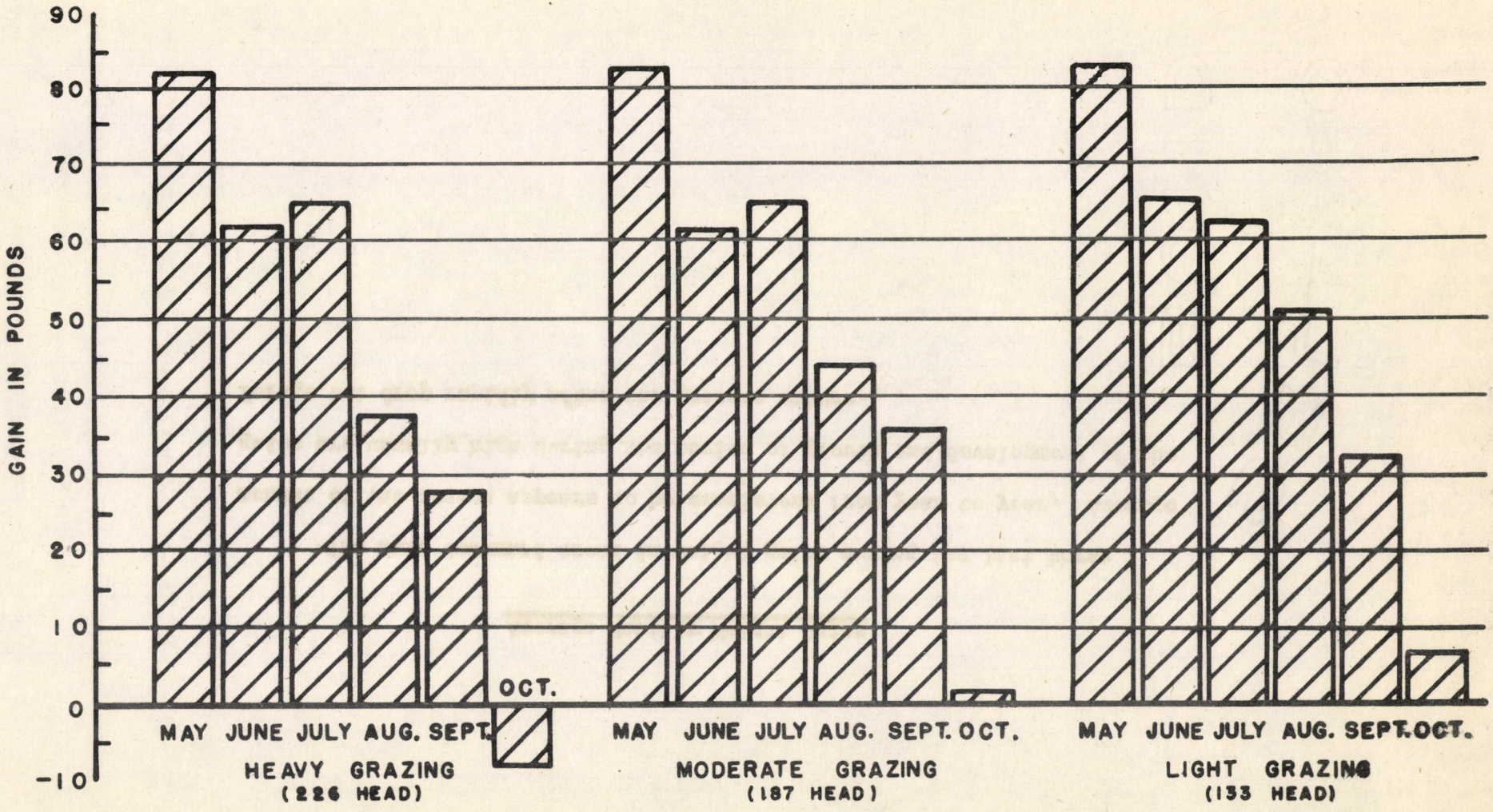
Average Monthly Weight Gains

Regardless of the rate of stocking the average monthly gain per animal starts to decline very rapidly during August and by October very little gain and even actual losses may occur. Lack of quality of forage rather than lack of volume appears to be the outstanding factor contributing to this trend.



AVERAGE MONTHLY WEIGHT GAINS OF YEARLING HEIFERS

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT GRASS RANGES 1940-1942

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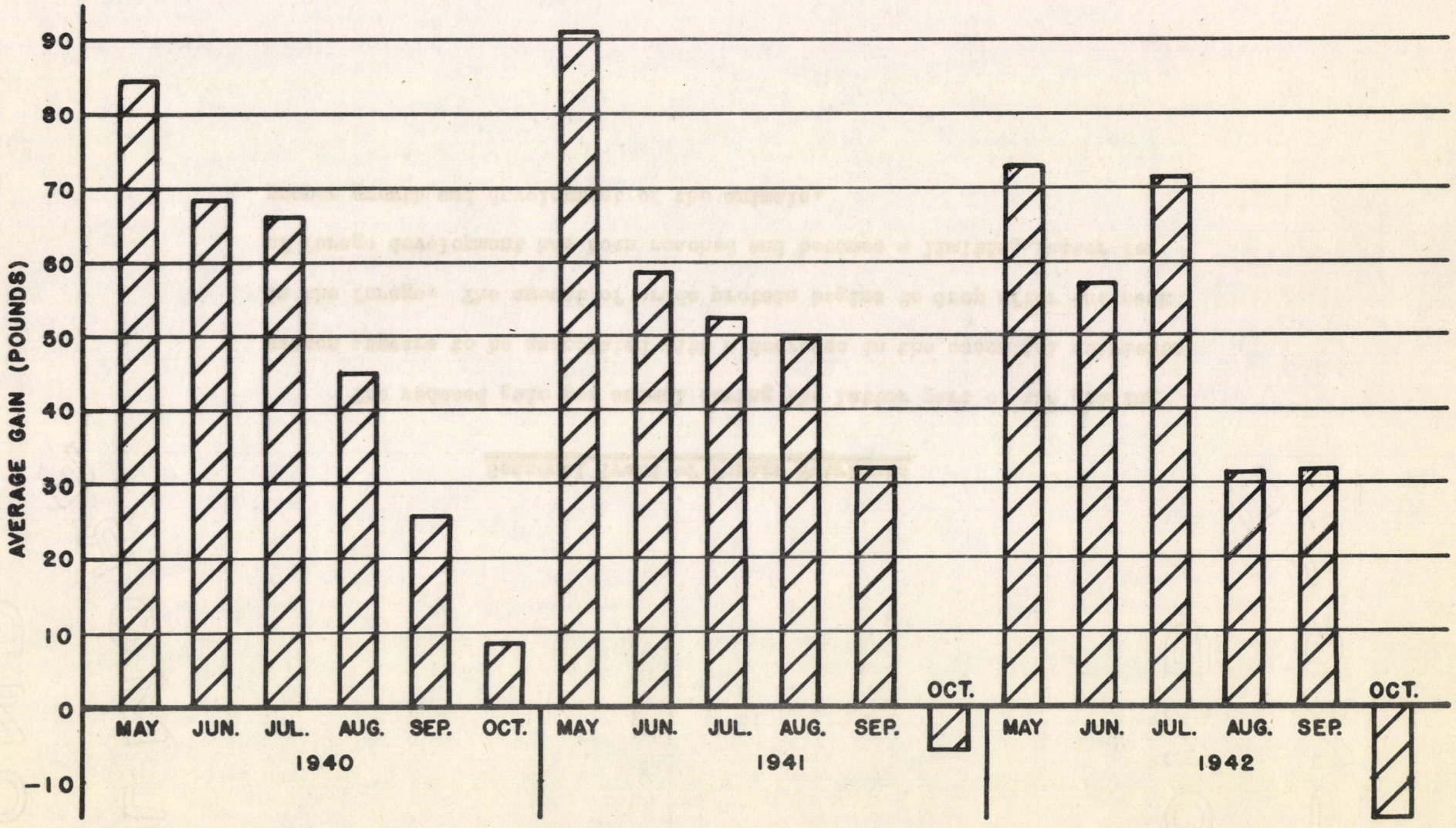
Average Monthly Weight Gains

The same downward trend in weight gains during the last three months of the season appears to be consistent from year to year. Average gains are usually high during the period of growth and development of the forage but drop rapidly after the grasses mature.

AVERAGE MONTHLY CATTLE WEIGHT GAINS

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT-GRASS RANGE



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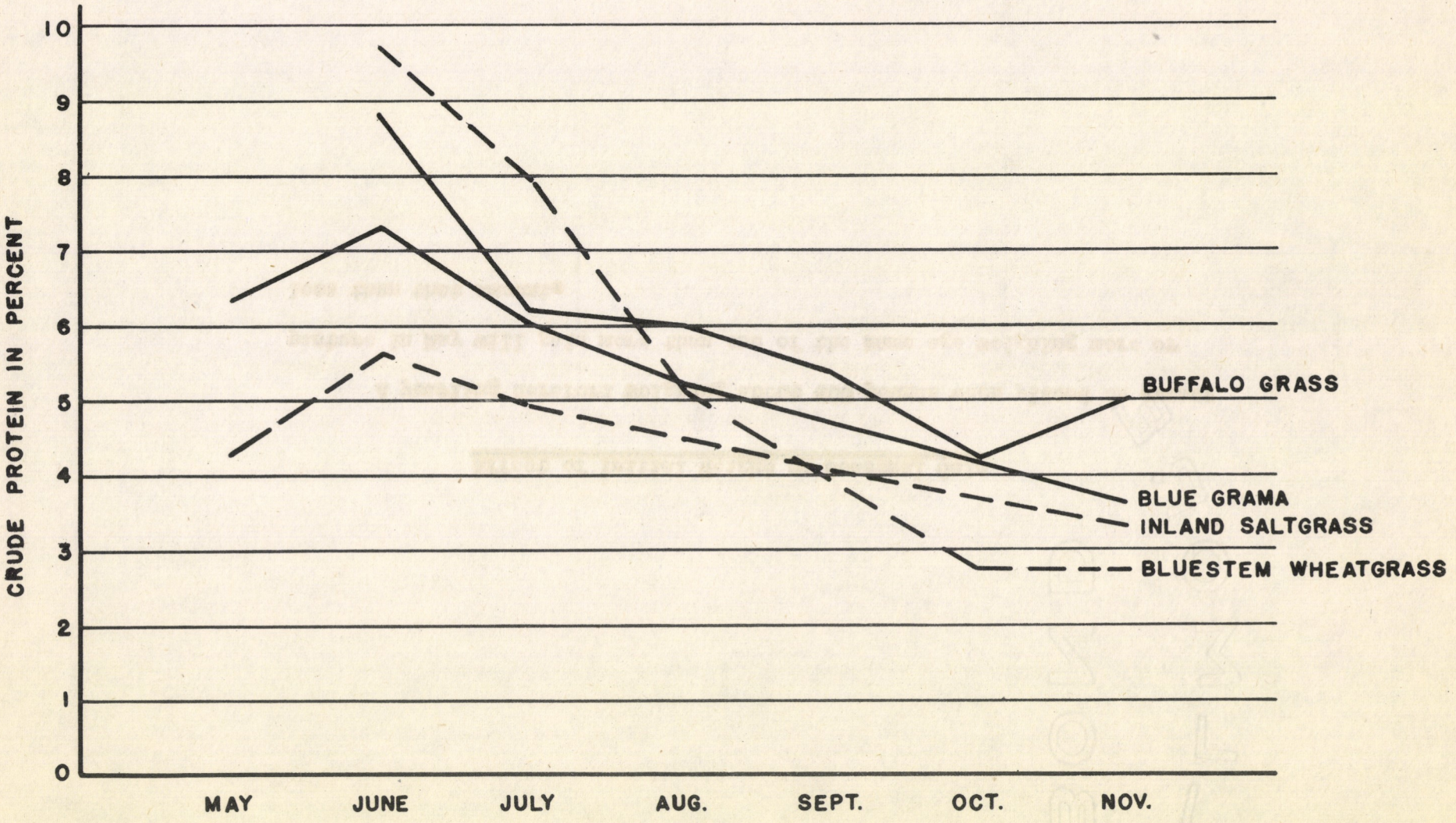
Seasonal Trend of Forage Nutrients

The reduced gain per animal during the latter part of the grazing season appears to be associated with a decrease in the essential nutrients in the forage. The amount of crude protein begins to drop after the peak of forage development has been reached and becomes a limiting factor for proper growth and development of the animals.

SEASONAL TREND—PERCENTAGE CRUDE PROTEIN

COLO. STATE COLLEGE AND CENTRAL PLAINS EXP. RANGE



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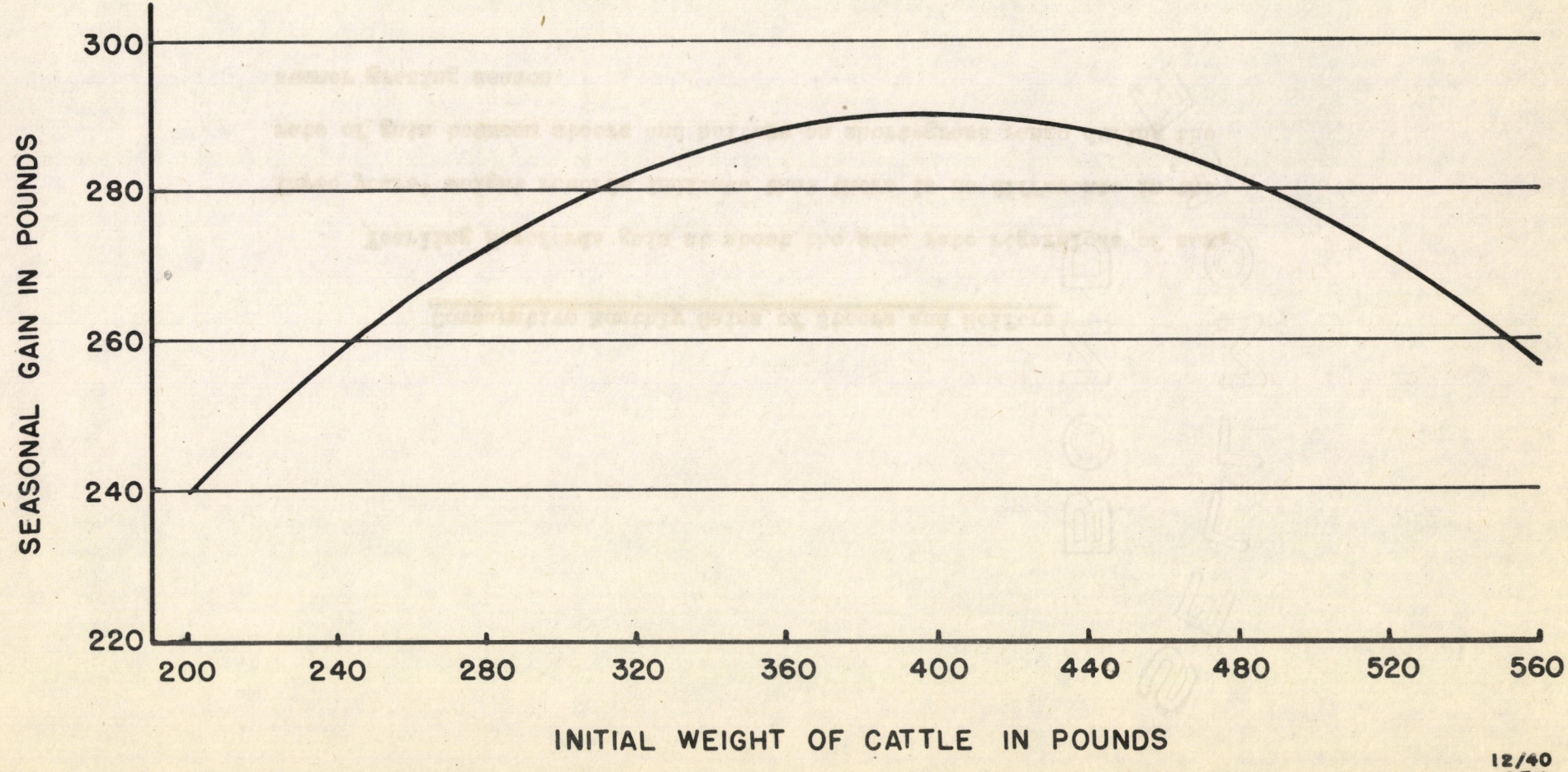
Effect of Initial Weight on Seasonal Gain

A yearling Hereford weighing about 400 pounds when placed on summer pasture in May will gain more than one of the same age weighing more or less than that amount.

RELATION OF INITIAL WEIGHT TO SEASONAL GAIN

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT—GRASS RANGE 1940



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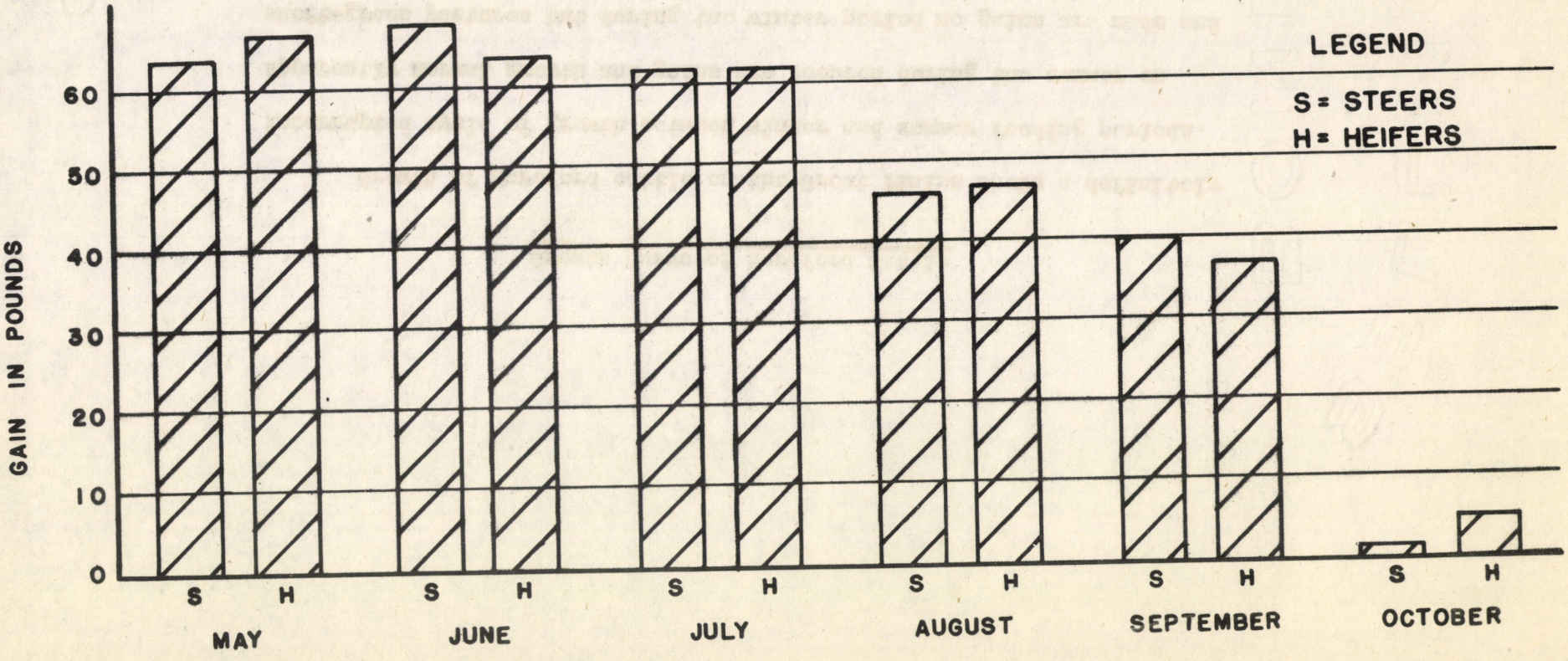
Comparative Monthly Gains of Steers and Heifers

Yearling Herefords gain at about the same rate regardless of sex. Three years' weight records indicate that there is no difference in the rate of gain between steers and heifers on short-grass range during the summer grazing season.

AVERAGE MONTHLY WEIGHT GAINS OF YEARLING STEERS AND HEIFERS

CENTRAL PLAINS EXPERIMENTAL RANGE 1940—1942



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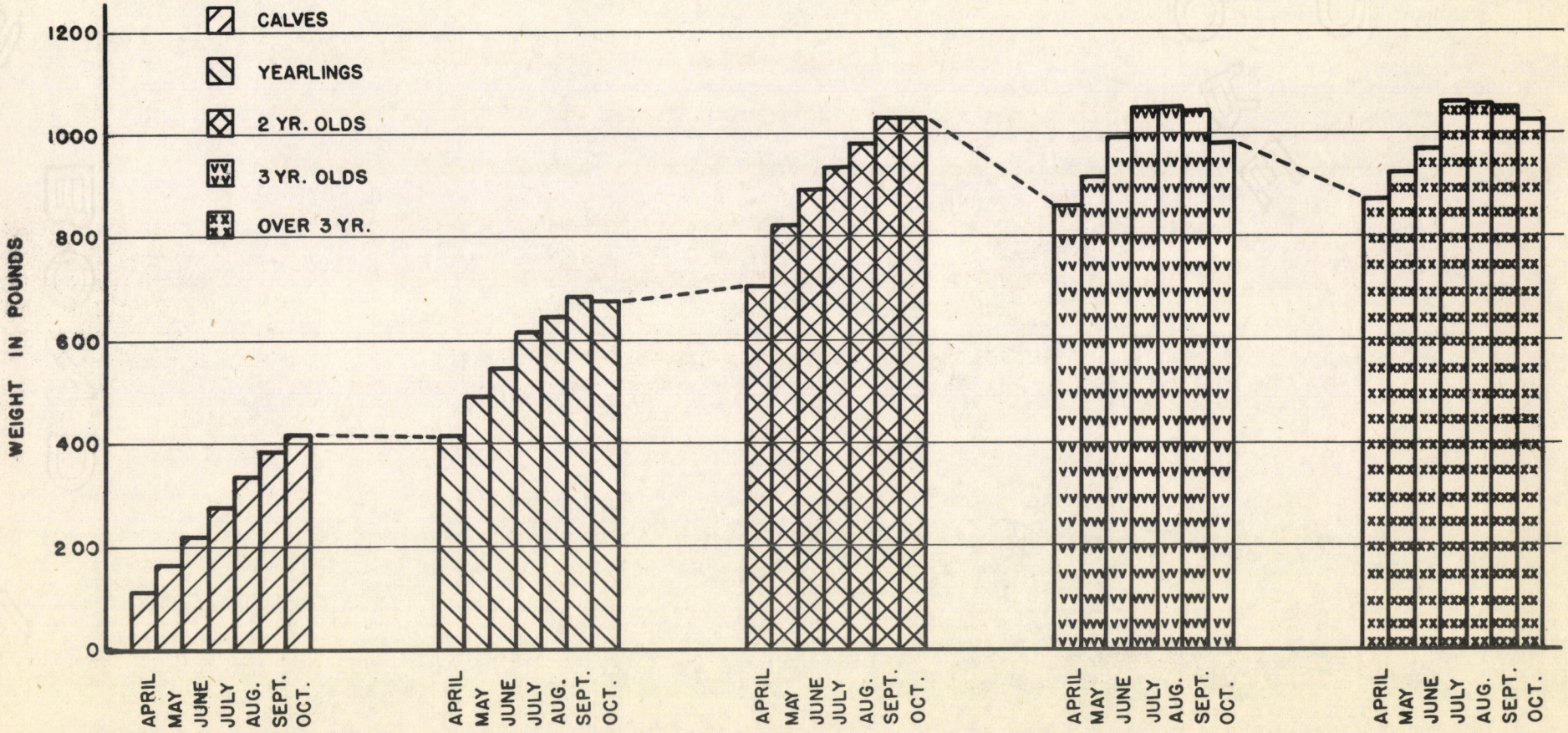
Growth Curve of Hereford Cattle

Growth of Hereford cattle on the Great Plains shows a definitely interrupted cycle of growth between winter and summer feeding periods. Apparently normal growth and gains are secured during the summer on short-grass pastures but during the winter period no gains are made and in breeding cows actual loss of weight usually occurs.

GROWTH TREND OF CATTLE FROM CALVES TO MATURE COWS

CENTRAL PLAINS EXPERIMENTAL RANGE

SHORT-GRASS RANGE



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MANITOU EXPERIMENTAL FOREST

Ponderosa Pine-Bunchgrass Range

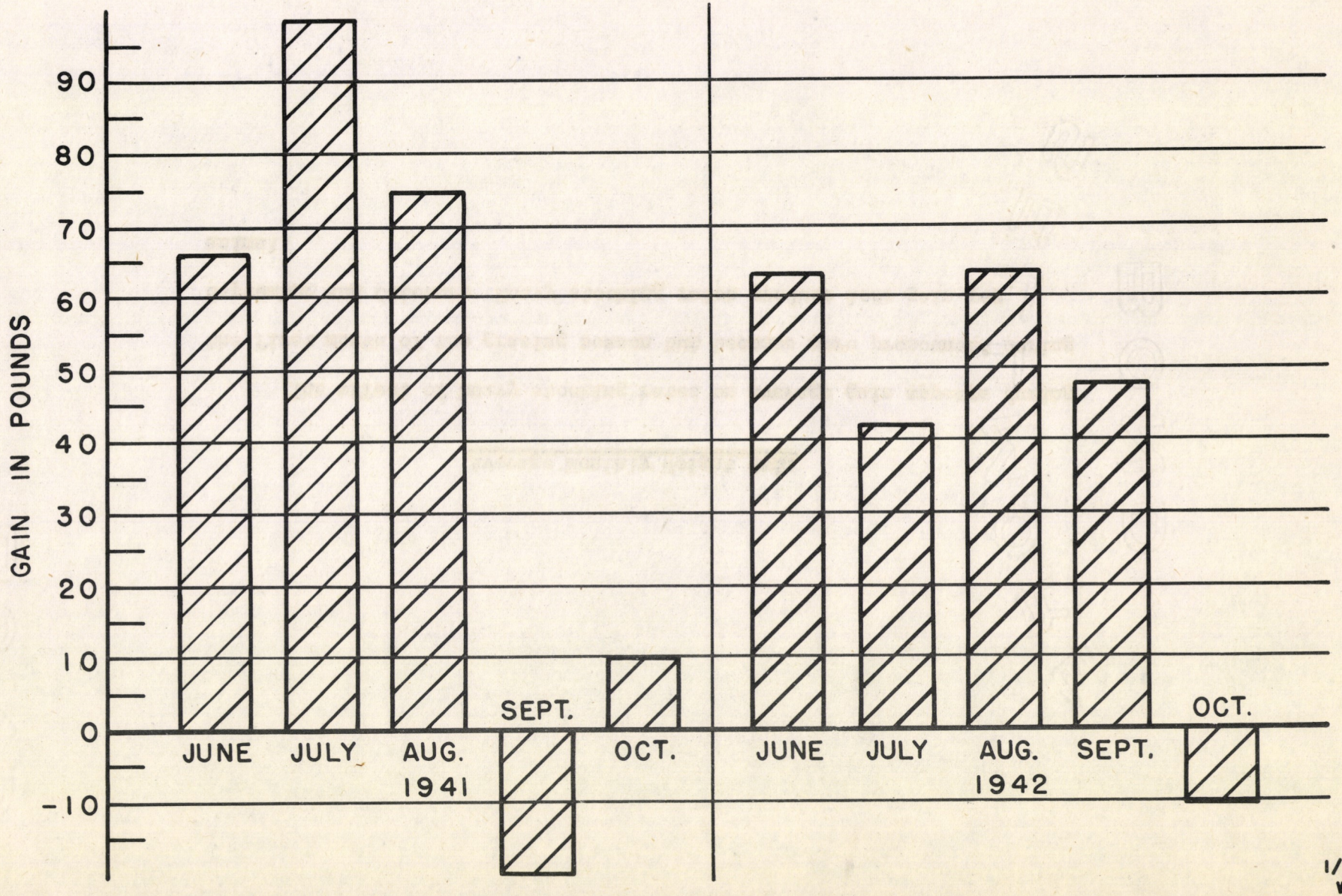
Average Monthly Weight Gains

On ponderosa pine-bunchgrass range monthly weight gains appear to be associated with climate; especially with the early fall storms and cold weather. In 1941 heavy wet snows and below freezing temperatures occurred during September and an average loss in weight of 20 pounds per animal was observed. In 1942, these same conditions, but not quite as severe, occurred during October and an average loss of 10 pounds per animal was recorded.

AVERAGE MONTHLY WEIGHT GAINS OF YEARLING HEIFERS

PONDEROSA PINE-BUNCHGRASS RANGES — MANITOU EXP. FOREST

PIKE NATIONAL FOREST — 1941 (61 HEAD) AND 1942 (82 HEAD)



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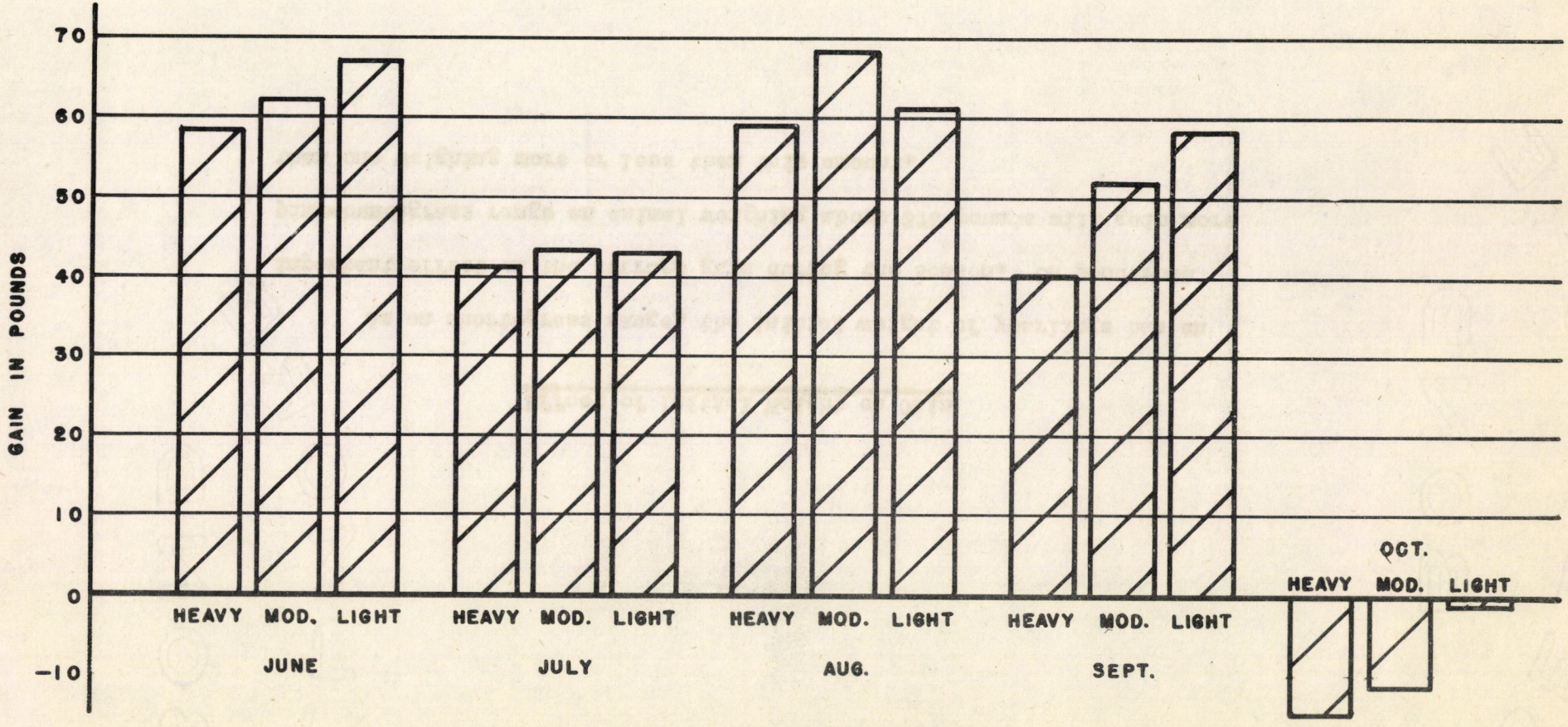
Average Monthly Weight Gain

The effect of heavy stocking rates on average gain appears during the first month of the grazing season but becomes more pronounced during September and October. Heavy stocking rates produce less gain per animal.

AVERAGE MONTHLY WEIGHT GAINS OF YEARLING HEIFERS

MANITOU EXPERIMENTAL FOREST 1942

PONDEROSA PINE—BUNCHGRASS RANGE



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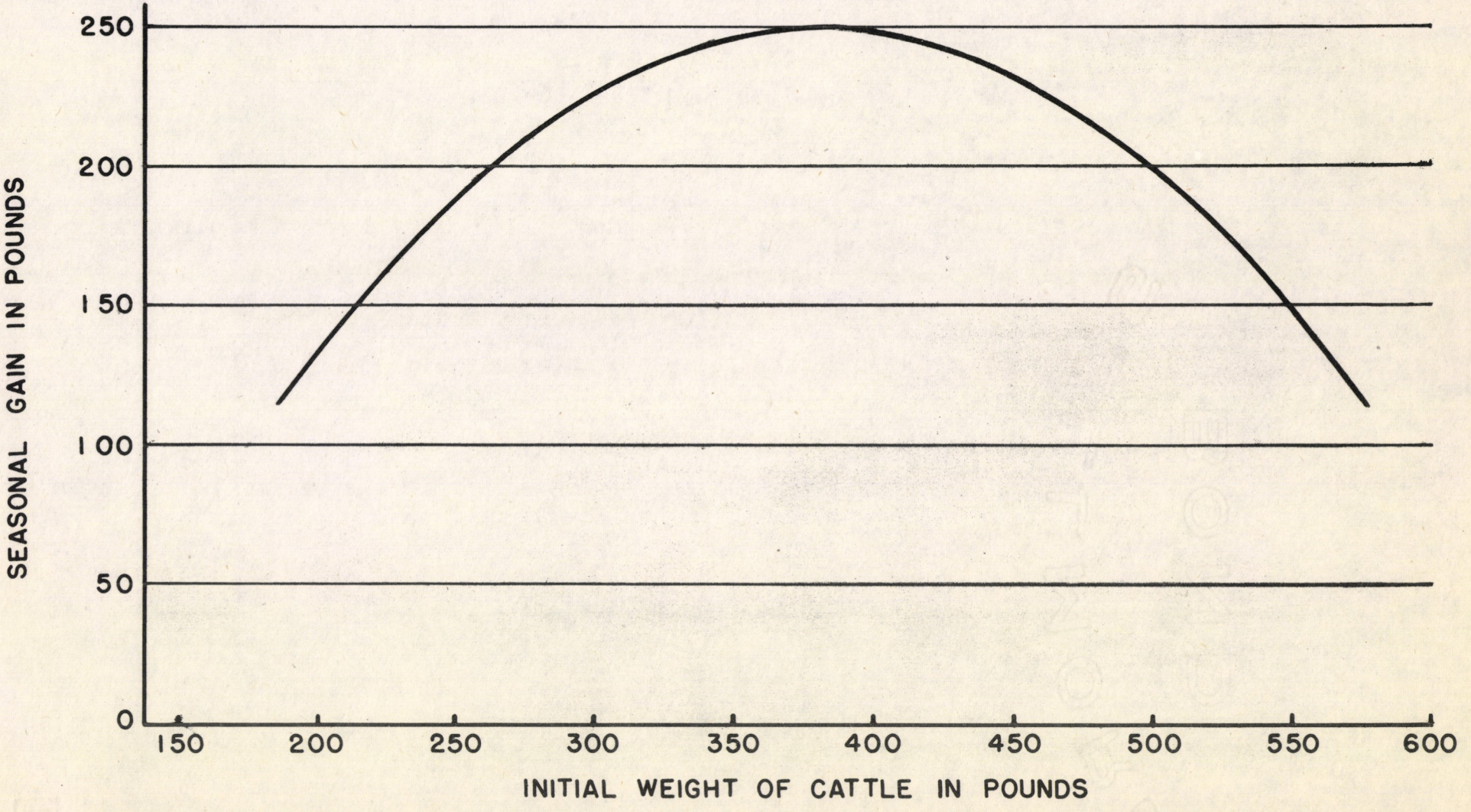
Effect of Initial Weight on Gain

As on short-grass range, the initial weight of yearlings has an important effect on the average gain during the season. On ponderosa pine-bunchgrass range an animal weighing about 375 pounds will gain more than one weighing more or less than this amount.

RELATION OF INITIAL WEIGHT TO SEASONAL GAIN

MANITOU EXPERIMENTAL FOREST 1942

PONDEROSA PINE—BUNCHGRASS RANGE



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